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Means-end analysis of consumers' perceptions of virtual world affordances for e-commerce

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How to cite:

Tran, Minh Quang; Minocha, Shailey; Roberts, David and Laing, Angus (2011). Means-end analysis of consumers' perceptions of virtual world affordances for e-commerce. In: INTERACT 2011 13th IFIP TC13 Conference on Human-Computer Interaction, 05-09 Sep 2011, Lisbon, Portugal.

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Version: Version of Record

Link(s) to article on publisher's website:

http://dx.doi.org/doi:10.1007/978-3-642-23774-4_30

<http://interact2011.org/index.php?q=technical-program-friday#TPS.321>

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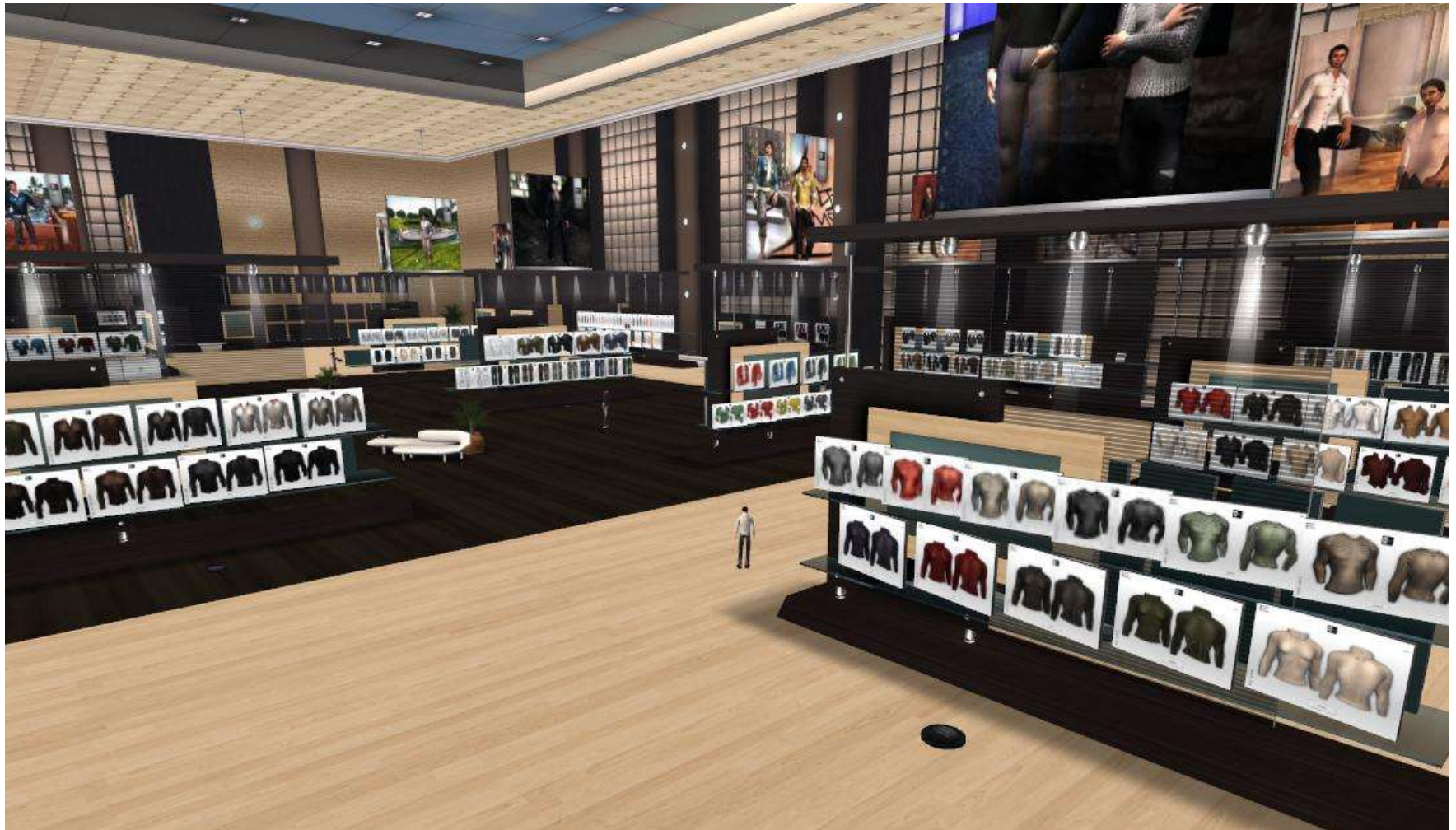
A Means-end Analysis of Consumers' Perceptions of Virtual World Affordances for E-commerce

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Co-authors and supervisors: Dr. Shailey Minocha, Mr. Dave Roberts, Prof. Angus Laing and Dr. Darren Langdridge

Virtual worlds can be used as an alternative e-commerce channel



But we need further empirical investigations to understand how they should be used





Presentation overview

- ◆ Background
- ◆ Methodology
- ◆ Results
- ◆ Summary

E-commerce is mainly conducted through websites



Virtual worlds are an alternative to websites



But, why should consumers use virtual worlds?





Virtual worlds supports different kinds of online experiences

- ◆ Representational Fidelity (Dalgarno and Lee, 2010)
- ◆ Presence and co-presence (Schroeder, 2011)
- ◆ Online communities and cultures (Castronova, 2005)



Research objectives

- ◆ Enhance e-commerce in virtual worlds
- ◆ Enhance e-commerce on websites
- ◆ Blend website and virtual world experiences



Methodology

- ◆ Laddering interviews
 - ◆ 30 participants
 - ◆ Conducted within Second Life (<http://www.secondlife.com>)

- ◆ Means-end chain analysis
 - ◆ Attributes, consequences and psychological needs
 - ◆ Combination of manual coding and analysis software
 - ◆ Software used: LadderUX.org (Abeelee and Zaman, 2011)



Step 1: Identify attributes, consequences and values

Consumer I3: *[on a website] you can't really tell what is persisting your connection to the person on the other end. It doesn't feel stable, and since you're a number for them, and they're a cookie for you... what happens if you accidentally close the window? [...] Just.... how would you re-contact that person? [...] It's one of the most inhuman interactions with (supposedly) another human possible, I think.*

[...]

Researcher: *So [Second Life] is different?*

Consumer I3: *Sure. Your whole power at your house can go out, lose your internet connection and have to restart your computer. When you log back on, you're in the same place you left off, and most likely, the same people are standing around and you can walk back up to the person you were talking to and say "LOL CRASH!" and they'll say "WB! LOL"*

Attribute: Persistent world

Consequence: Can talk to the same person

Value: Develop rapport or professional relationship



Step 2: Consolidate attributes, consequences and values

- 16 Attributes
- 19 Consequences
- 16 Values

Step 3: Create Hierarchical Value Map

- Software: Ladderux.org



Results – Attributes of virtual worlds

- ◆ Store attendants
- ◆ 3D environment
- ◆ 3D objects
- ◆ Multi-user environment
- ◆ Social network



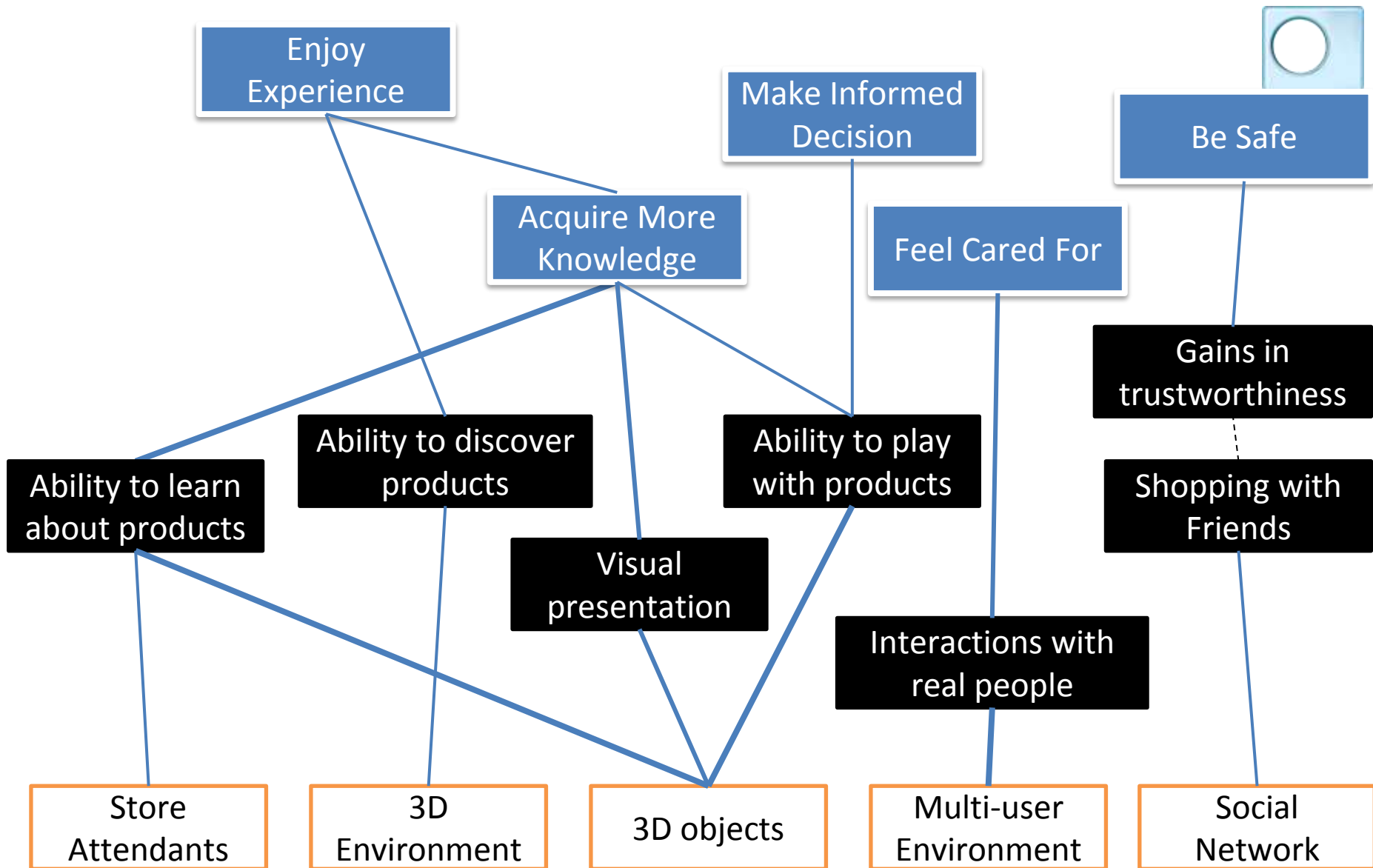
Results – Consequences of using virtual worlds

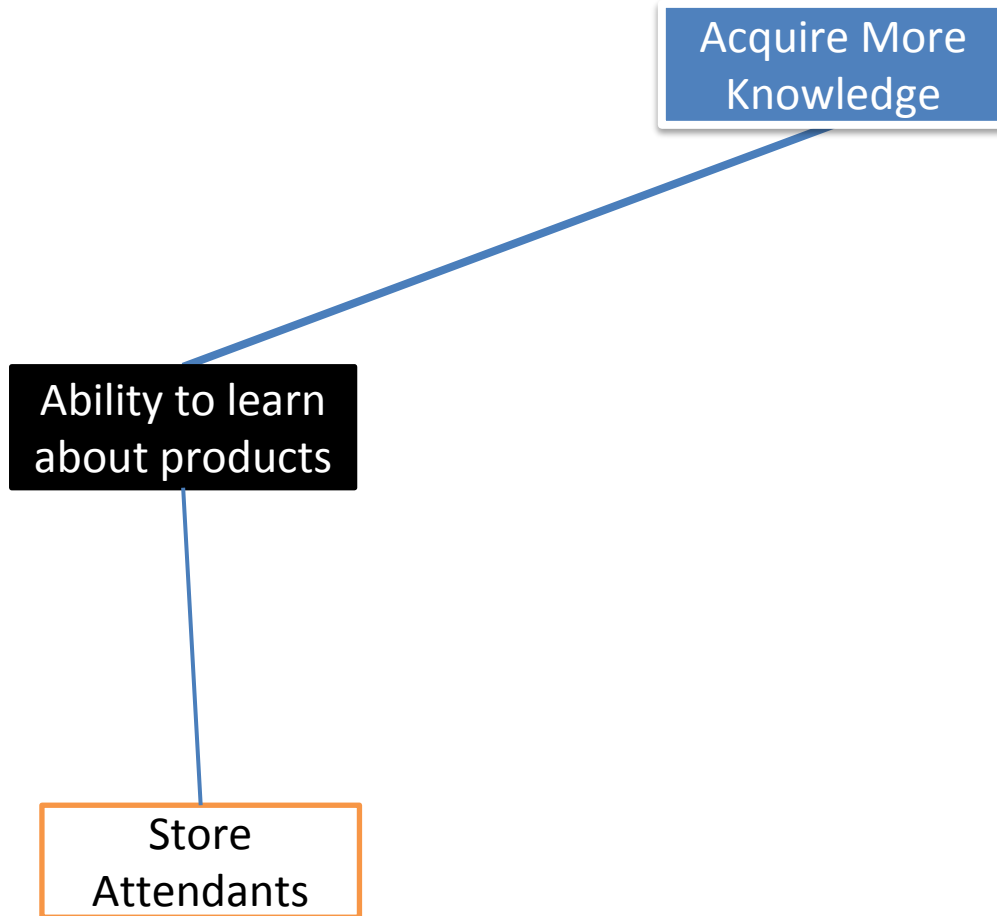
- ◆ Ability to learn about products
- ◆ Ability to discover products
- ◆ Ability to play with products
- ◆ Visual presentation
- ◆ Interact with people
- ◆ Increase trust
- ◆ Shop with friends

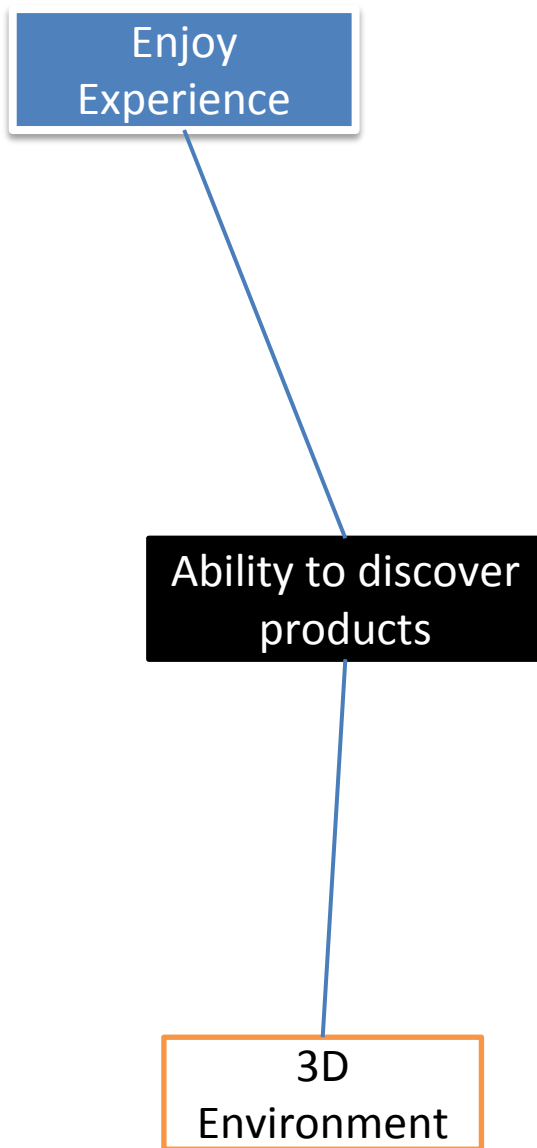
Results - Psychological needs of consumers

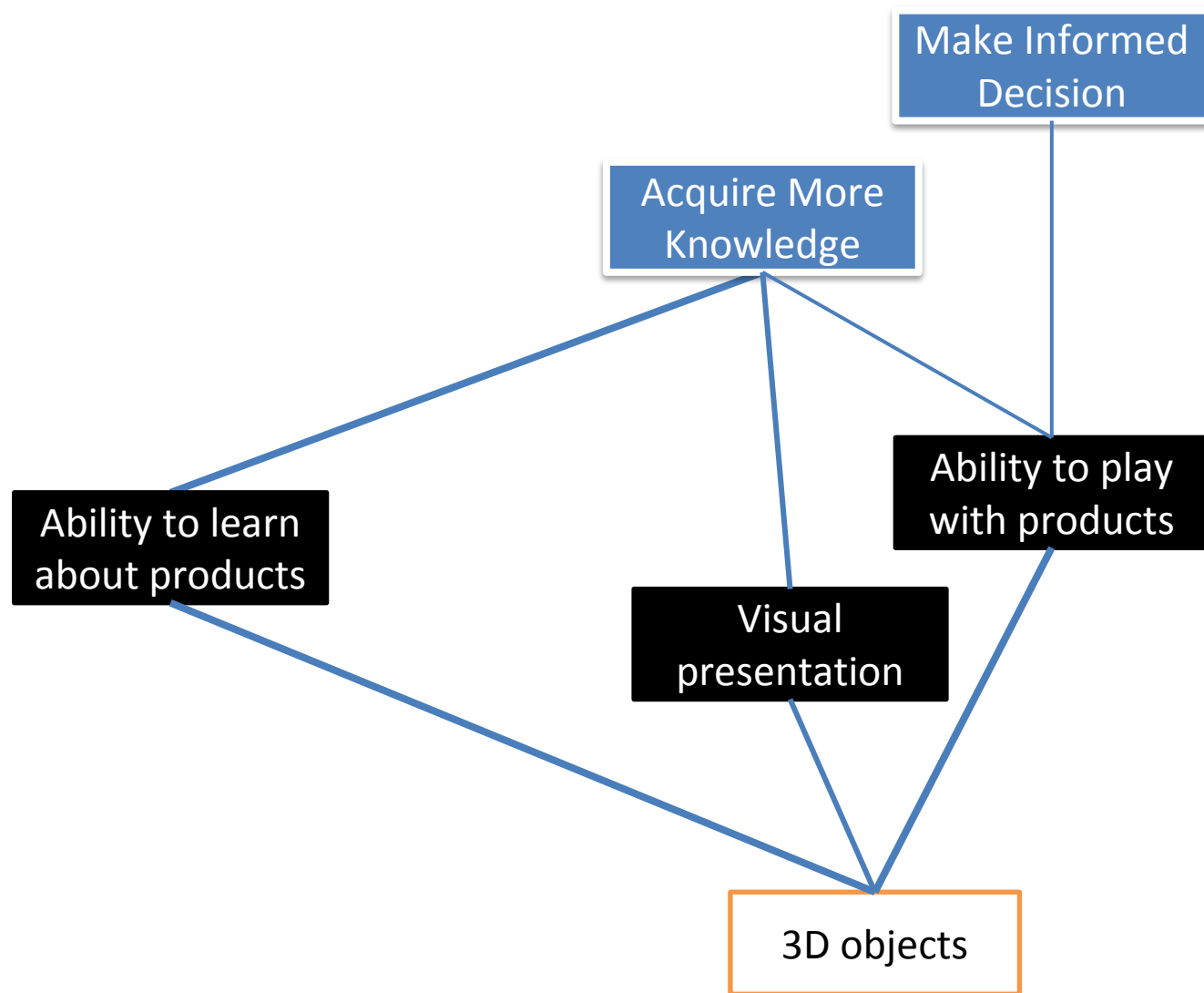


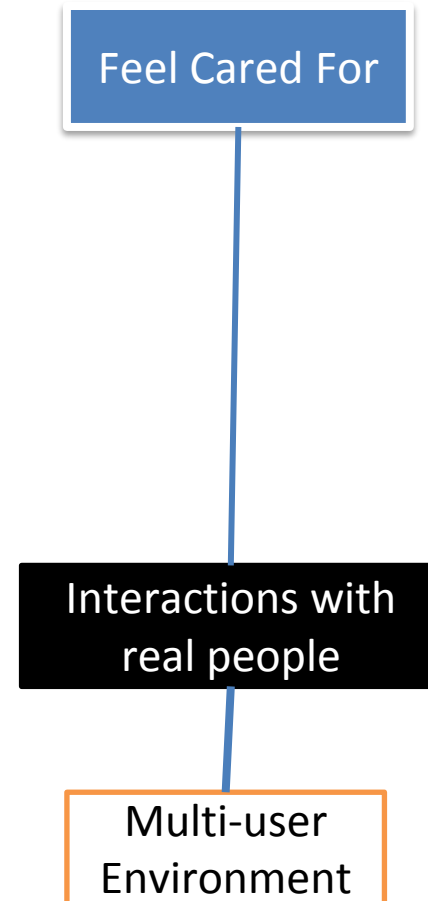
- ◆ Enjoy the experience
- ◆ Make informed decisions
- ◆ Be knowledgeable
- ◆ Feel cared for
- ◆ Be safe













Be Safe

Gains in
trustworthiness

Shopping with
Friends

Social
Network

Virtual worlds can be used as an alternative e-commerce channel



Focus on key affordances, which are store attendants, 3D environments, 3D objects, multi-user environment and social networks.





Implications

- ◆ Blending virtual worlds and websites
- ◆ User needs and expectations
- ◆ Blending virtual worlds and websites



Thank you for listening

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References



- Abeele, V.V. & Zaman (2011). *LadderUX*. [Software] Downloaded from <http://www.ladderux.org>
- Dalgarno, B., & Lee, M. J. W. (2010). What are the learning affordances of 3-D virtual environments? *British Journal of Educational Technology*, 41(1), 10-32.
- Castronova, E. (2005). *Synthetic Worlds - The Business and Culture of Online Games*. London: University of Chicago Press.
- Schroeder, R. (2011). *Being There Together: Social Interaction in Virtual Environments*. New York, New York: Oxford University Press.

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HUMAN-COMPUTER INTERACTION - INTERACT 2011

Lecture Notes in Computer Science, 2011, Volume 6946/2011, 362-379, DOI: 10.1007/978-3-642-23774-4_30

Slide 1 - Title slide

Hi, my name is Minh

I'm a PhD student at the Open University

My project is on e-commerce and virtual worlds.

My supervisors are Shailey Minocha, Dave Roberts, Angus Laing and Darren Langdridge

We study consumers' experiences in virtual worlds; and based on this research we are deriving a set of design guidelines for e-commerce environments in virtual worlds.

Today, I'm going to talk about a study we conducted on consumers' perceptions of virtual world affordances, which was one study that is part of a larger project.

Slide 2 – Virtual worlds can be used as an alternative e-commerce channel

We are interested in the topic of virtual worlds because they are growing in popularity and because there seems to be many uses for virtual worlds.

Virtual worlds are probably most well known as gaming platforms, such as with World of Warcraft with over 12 million players, Other gaming worlds include guild wars, lord of rings online and city of heroes each have 100s of thousand users, if not millions.

There are also non-gaming virtual worlds such as Second Life, which also has more than a million users

What virtual worlds offer is mainly an online space for users to interact, create and share information. In terms of possibilities, it is like the web the, except virtual worlds are graphically much richer spaces, and they are inherently synchronous spaces. So virtual worlds are designed from the start as places for real-time interaction

Naturally, one application domain for virtual worlds that seems worth developing is e-commerce. And that has been done... real world businesses have done product placements, mini-games and advertising in virtual worlds.

Slide 3 – But we need further empirical investigations to understand how they should be used

However, they were not very successful. As evidence by the fact that they are no longer in virtual worlds. So businesses have been unable to sustain a presence in the virtual world.

This suggests that more research is needed to understand how virtual worlds can be utilised more effectively

And the main point of this talk to show our findings from our investigation into that problem.

This is a picture here of a store attendant waiting until an empty shop. Currently, most of the e-commerce online is for virtual items. We're actually interested, however, in e-commerce for real items. But we think that learning about how e-commerce is done with virtual items can provide insight for how e-commerce will occur with real items.

Slide 4 – Presentation Overview

The rest of the presentation is broken down as follows...

I'll talk a little more about the background,
Then talk about methodology
Then I'll discuss the results
And finally I'll summarise the findings at the end

Slide 5 – E-commerce is mainly conducted through website

E-commerce today is conducted mainly through 2D websites. Sites like eBay and Amazon are hugely successful. And rightfully so, they allow consumers to search, browse, buy and receive items very quickly. And they continue to evolve to get better. New recommendation systems are getting better at providing targeted suggestions, usability is improving, and the range of products being offered is growing. So it's going to be very hard to replace websites. And there really is no need to.

Slide 6 – Virtual worlds are an alternative to websites

What, we are suggesting however is that virtual worlds can be used to compliment or enhance the e-commerce experience. When websites are not enough, and when going to the actual stores on the high street is too much of a hassle. Virtual worlds might provide an intermediary. They seem to have some affordances that make them like websites. And they have other affordances that make them like the real world

These are just some examples of virtual worlds that can potentially be used for e-commerce. Second Life has been around since 2003, but remains one of the most popular virtual worlds, even when compared to gaming worlds. Avaya, blue mars and near global have launched their own virtual worlds within the last few years. Each of these is capable of supporting e-commerce and can be considered the latest technology

Slide 7 – But, why should consumers use virtual worlds?

The question still remains though, why virtual worlds? Between websites, real world stores, as well as open options such as catalogues and telephone. What would virtual worlds offer to make it stand out as a retail channel?

This is a picture of Reebok's store in Second Life. Reebok created a store in 2006. Consumers could buy virtual shoes for 25 cents. At the same time, Reebok also had a website that allowed consumers to customise and buy a real pair of shoes for about 100US. So the Reebok store was a way to create interest and perhaps cross-domain marketing.

Slide 8

The literature can provide some suggestions. Virtual worlds are a relatively established field of study in its own right, particularly in education and training. Simulation is usually discussed as a major advantage of virtual worlds. In terms of desktop computer graphics, virtual worlds offer amongst the highest fidelity graphics. Virtual world render environments and objects in nice detail.

A rich visual environment, combined with interactivity and multimedia capabilities facilitates presence and co-presence. Presence is the feeling of being in a space. When using virtual worlds, it is easier to project yourself as being in his virtual world. You're senses are taken over and you're full attention is given to what's happening on screen. Co-presence is the being of there together. So it's an extension of presence. Presence is when you feel you are in the virtual environment. Co-presence is when you feel you are in the virtual environment with someone else.

Third on this slide are online communities and cultures. Although there are online communities on the web, the communities are more visible in virtual worlds; partly related to co-presence. The community aspects are felt even more in virtual worlds because virtual worlds support real-time collaboration. So you feel as though others are there with you, but also you work collaboratively with them to accomplish things, whether it's killing dragons or attending a lecture.

So given the affordances of virtual worlds, we sought to contextualise this understanding by investigating how they are useful for e-commerce

Slide 9 - Objectives

[Discuss objectives]

Slide 10 - Methodology

Our methodology was to use laddering interviews. Laddering interviews were good because they would allow consumers to discuss their perceptions of the affordances of virtual worlds, but also through laddering, we can understand the deeper psychological motivations that underlie the perceptions.

30 consumers were interviewed in Second Life. Second Life, as noted earlier, is a popular virtual world. Since it's also been around for many years, it has an established virtual economy with shopping activity that involves real world money. Also based on an earlier study we did, we found the consumption process to be very similar to real world

consumption. Consumers start with a consumption need, then they would visit different stores and pick out products, compare the products and then make the purchase. So it resembled very much, what real world shopping would look like. These consumers that we interviewed were asked to think about consumption experiences they've had and then to talk about how the affordances of virtual worlds helped them identify, find, deliberate and purchase products.

A means-end chain analysis was then conducted on the interviews. With means end chain analysis, the aim is to extract means-ends chains from the interview data. Each means-end chain includes an attribute, which is a feature of the virtual world... the feature is connected to a desired consequence. And that consequence is connected to an underlying psychological need

The means-end chains were entered into a software application that automatically tabulated the scores for the chains and produced a hierarchical value map, which I will show later.

Slide 11 – Data analysis

[Read data]

Slide 12 – Data analysis

[Discuss steps in analysis]

Slide 13 – Results: Attributes of virtual worlds

The most commonly mentioned attributes are... store attendants, 3D environment, 3D objects, multi-user environment, and social networks...

Consumers noted these features the most. Usually an interview would start by asking the consumer what features help them shop in virtual worlds; these are the features that were mentioned most often.

Slide 14 – Results: Consequences of using virtual worlds

This slides shows the consequences that came up the most... these are related to ability to learn about products, the ability to discover products, play with products, seeing the products in 3D, interactions with real people, developing trust, and having shopped with friends

These are outcomes of using virtual worlds. They refer to what consumers do, or what happens to consumers while shopping

Slide 15 – Results: Psychological needs of consumers

Based on the means-end chains that were found in the data, we have 5 psychological needs that came up the most... these are to enjoy the experience, make informed decisions, acquire knowledge, feel cared for and be safe

Slide 16 – Results – Hierarchical Value Map

Now I'll show how the attributes, consequences and psychological needs are related.

I'll break down this diagram and explain the part individually with the next few slides. But for now, it's important to know that the boxes at the bottom are the attributes, the middle boxes are consequences at the boxes up top are psychological needs

Slide 17 – Results – Hierarchical Value Map

So the first pattern or means-end chain starts with store attendants... store attendants help consumer learn about products, which allows them to acquire knowledge. (These chains are based on consumers' perceptions, which are based on their consumption experiences)

Slide 18 – Results – Hierarchical Value Map

The next pattern starts with 3D environments. 3D environments facilitate product discovery... probably because consumers can see store layouts from above, also in a 3D environment, objects can be placed side by side... some consumers also mentioned walking around in the space, and turning around to a different wall with different products... and discovering products was important because it led to having more fun

Slide 19 – Results – Hierarchical Value Map

The next pattern starts with 3D objects. With 3D objects, consumers learn about products, they can see products in 3D and they can interact or play with products. These actions are useful because they allow the consumer to learn about the product and make informed purchase decisions.

Slide 20 – Results – Hierarchical Value Map

The fourth pattern starts with multi-user environments. Multi-user environments allow consumers to interact with other people, and this leads to a more personal experience.

Slide 21 – Results – Hierarchical Value Map

The fifth and last pattern starts with social networks. The presence of social networks allows consumers to shop with friends. There's also a weaker link between shopping with friends and gaining trust, which is related to the need to feel safe. Safety here mainly refers to the risk of theft (such as a business not honouring the agreement) and protection of personal information

Slide 22 - Conclusion

So those patterns highlight what is important in virtual worlds. And shows how virtual worlds can address consumers' needs.

Slide 23 - Conclusion

The next step is to build virtual world environments that satisfy consumers' needs. And a good starting point would be to focus on the key affordances that consumers mention as important

Slide 24 - Implications

[Discuss implications]

Slide 25

Thank you for listening.